

### **REMARKS**

This is in response to the second non-final Office Action dated December 8, 2008 (the second non-final Action).

#### **I. Status of the Claims**

Claims 1-2, 4-6, 8-23 and 37-38 stand rejected under Section 103(a) as being unpatentable over U.S. Patent No. 5,444,786 to Raviv (Raviv) in view of U.S. Patent No. 5,844,996 to Enzmann (Enzmann). Claim 3 stands rejected under Section 103(a) as being unpatentable over Raviv and Enzmann in view of U.S. Patent No. 6,665,410 to Parkins (Parkins). Claim 7 stands rejected under Section 103(a) as being unpatentable over Raviv and Enzmann in view of what the second non-final Action refers to as Raviv's admitted prior art. Claims 24 and 25 stand rejected under 35 U.S.C. 102(b) as being anticipated by Enzmann. Claim 26 stands rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,199,424 to Sullivan (Sullivan). Claims 27, 30-31 and 36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Enzmann.

Applicants hereby request further consideration of the application in view of the amendments above and the comments that follow.

#### **II. Claims 24 and 25**

The rejection of Claims 24 and 25 is improper as being inconsistent with the Notice of Panel Decision from Pre-Appeal Brief Review mailed September 30, 2008 (the Panel Decision).

The rejection of Claims 24 and 25 is identical to the rejection in the final Office Action mailed March 20, 2008 (the Final Action). Applicants filed a Request for Pre-Appeal Brief Review on June 18, 2008 (the Pre-Appeal Request). The Panel Decision in response to the Pre-Appeal Request states that the rejection is withdrawn. However, the second non-final Action maintains the identical rejection that was withdrawn by the Panel Decision. Therefore, Applicants submit that the rejection of Claims 24 and 25 is inconsistent with the Panel Decision and is improper.

The second non-final Action takes the position that the Abstract of Enzmann states that "the second electrical signal was created to cancel the noise from the first electrical signal without utilizing the sound from the second sound location." *See* the second non-final Action, page 2. However, the second electrical signal in Enzmann is merely a cancellation signal and is not an adaptive filtering function that approximates a second modified sound (at a second location) from the first sound (at a first location) as recited in Claims 24 and 25. In fact, Enzmann discusses that "[a] microphone is disposed in the second sound rejection for detecting any noise above a predetermined noise level in the second sound region to provide an error correction signal." *See* Abstract. Enzmann does not disclose or render halting detecting of the modified sound or an adaptive filtering function that approximates a second modified sound from a first sound without requiring additional sound input from the second location as recited in Claims 24 and 25.

Moreover, as stated in the Pre-Appeal Request, Enzmann proposes that noise is sensed in the first sound region to provide a first electrical signal, and the first electrical signal is processed to produce a second signal, which is converted to anti-noise for attenuation of the sensed noise in the second sound region. *See* Abstract. A microphone is disposed in the second sound region for detecting any noise above a predetermined noise level to provide an error correction signal, which Enzmann also refers to as adaptive filtering. *See* Abstract; col. 2, lines 40-43 (cited in the second non-final Action). Applicants submit that the anti-noise signal in Enzmann is apparently based on real-time detection (*see, e.g.*, Claim 2), and thus, Enzmann does not disclose the recitations of Claims 24 and 25 emphasized below with respect to Claim 24:

24. A method for canceling sound, comprising:  
determining an adaptive filtering function, the adaptive filtering function approximating the second modified sound from the first sound;  
halting detecting of the modified sound; and  
determining a cancellation signal proximate the second location from the first sound and the adaptive filtering function.

Claim 25 recites as follows:

25. A method for canceling sound, comprising:

detecting a first sound at a first location;  
detecting a modified second sound at a second location, the modified second sound being a result of sound propagating to the second location; and  
determining an adaptive filtering function, the adaptive filtering function approximating the second modified sound from the first sound *without requiring additional sound input from the second location*.

Accordingly, Applicants submit that Enzmann does not disclose or render obvious the recitations of Claims 24-25 and it is requested that the rejections of Claim 24-25 under 35 U.S.C. 102 be withdrawn.

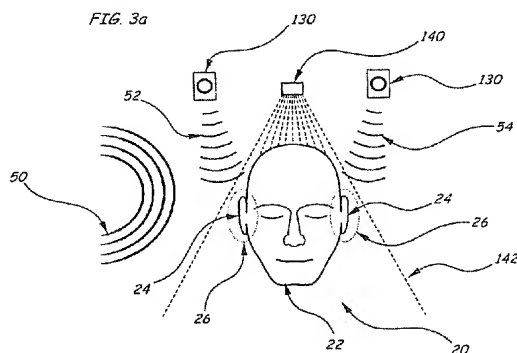
### III. Claim 1

Claim 1 recites a system for sound cancellation including:

a source microphone for detecting sound propagating from a sound source;

a speaker configured to direct a canceling sound toward a cancellation location that is spatially remote from the sound source, and

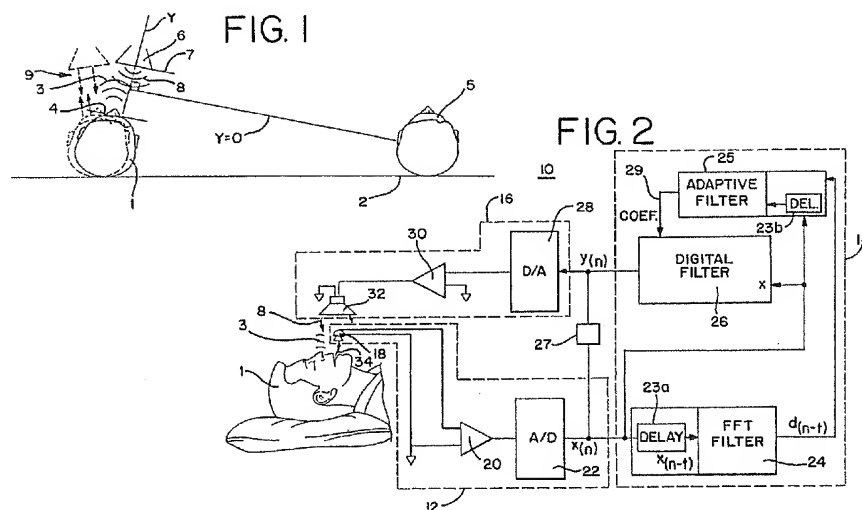
a computational module in communication with the microphone and the speaker, the computational module configured to receive a signal from the microphone, identify a cancellation signal using a predetermined adaptive filtering function responsive to an acoustic environment of the cancellation location, and transmit a cancellation signal to the speaker.



Claim 1 recites that the speaker is configured to direct a canceling sound toward a cancellation location that is spatially remotely from the sound source. For example, as shown

in **Figure 3a** of Applicants' Specification (reproduced above), the speakers **130** may produce a cancellation space **26** with respect to the ears **24** of the bed partner **20** by directing canceling sounds **52, 54** toward the ears **24**. The cancellation space **26** is spatially remote from source of the snore sound **50**. See Applicants' Specification, paragraph 40.

In contrast, Raviv proposes a speaker **6** that emits a snore-canceling signal **8** towards the sound source, *i.e.*, in an opposing direction to that of the snore signal **3** and towards the snore source **4**. As can be seen, for example, in **Figures 1-2**, the speaker **6** moves so that the snore canceling signal **8** is emitted towards the snore source **4** in an opposing direction along the Y-plane. See Raviv, column 5, line 51 – column 6, line 11.



The second non-final Action concedes that Raviv does not disclose a speaker that is configured to direct a canceling sound toward a cancellation location. The second non-final Action takes the position that this recitation is disclosed in Enzmann. However, the second non-final Action ignores the clear teaching in Raviv that propagation of the snore-canceling signal **8** in a direction along the Y-plane provides suppression of snoring signals at more than one point, which Raviv refers to as "global suppression." See column 6, lines 8-11. The techniques proposed by Raviv appear to be inoperable if the snore-canceling signal were directed somewhere other than towards the snore source. Because the proposed combination

of Raviv with the speakers **46** of Enzmann would render the system of Raviv to be **inoperable**, Raviv **teaches away** from the proposed combination.

For at least these reasons, Raviv and Enzmann do not disclose or render obvious the recitations of Claim 1. Claims 2-17 depend from Claim 1 and are likewise patentable over the cited art. Accordingly, Applicants request that the rejections under 35 U.S.C. 102/103 of Claims 1-17 be withdrawn.

#### **IV. Claim 18**

Claim 18 recites a method of sound cancellation comprising:

- detecting a sound input at an input location that is spatially remote from a sound source;
- identifying a cancellation signal for the sound input with respect to a cancellation location that is spatially remote from the sound source using a predetermined adaptive filtering function; and
- broadcasting a cancellation sound for canceling sound proximate the cancellation location in a direction toward the cancellation location.

As noted above with respect to Claim 1, Raviv proposes directing a canceling signal **8** towards a snore source 4 to provide "global suppression" and would be **rendered inoperable** if combined with the speakers **46** of Enzmann. Accordingly, Raviv and Enzmann do not disclose or render obvious "broadcasting a cancellation sound for canceling sound proximate the cancellation location in a direction toward the cancellation location" and the cancellation is spatially remote from the sound source as recited in Claim 18.

For at least these reasons, Raviv and Enzmann do not disclose or render obvious the recitations of Claim 18. Claims 19-23 depend from Claim 18 and are likewise patentable over the cited art. Accordingly, Applicants request that the rejections under 35 U.S.C. 103 of Claims 18-23 be withdrawn.

#### **V. Claim 26**

Claim 26 recites a method for analyzing sound for health conditions including  
providing a microphone spatially remote from a subject;

analyzing a sound input to the microphone to determine if a change in respiratory sounds occurs sufficient to identify a health condition comprising at least one of: sleep apnea, pulmonary congestion, pulmonary edema, asthma, halted breathing, abnormal breathing, arousal, and disturbed sleep.

The second non-final Action concedes that Sullivan "fails to disclose the microphone being spatially remote from a subject," yet the second non-final Action takes the position that it would have been obvious to use a directive microphone further away from the user of Sullivan et al. for the purpose of creating a dynamic system." However, Sullivan discusses a continuous positive airway pressure (CPAP) system in which a pressure or sound transducer is located in the CPAP nose mask. Sullivan states that "[b]y enclosing the microphone, a physical noise barrier isolates the microphone from external sounds." *See* col. 4, lines 50-52. The nose mask is substantially fluidly sealed to the nasal air passages of the patient and the sound transducer is in sound communication with the interior of the nose piece "so as to be, when in use, in sound communication with the respiratory system of the patient and to detect and produce a signal responsive to the sounds of patient snoring..." *See* col. 5, lines 13-19. Accordingly, Sullivan teaches away from a microphone that is spatially remote from a subject, and moreover, Sullivan does not disclose how the techniques discussed therein, which rely on a microphone that is in the interior of the nose mask, could be modified to be used in a microphone that is spatially remote from a subject.

Accordingly, Applicants submit that Sullivan does not disclose the recitations of Claim 26 and request that the rejections under 35 U.S.C. 103 be withdrawn.

#### **VI. Claims 27 and 31**

Claim 27 recites a system for sound cancellation including:

- a source microphone for detecting sound; and
- a parametric speaker configured to transmit a canceling sound configured to cancel the detected sound such that the canceling sound is localized with respect to a cancellation location.

Claim 31 recites a method for canceling sound comprising:

detecting a sound; and  
transmitting a canceling signal from a parametric speaker that  
locally cancels the sound with respect to a cancellation location.

The second non-final Action concedes that Enzmann does not disclose a parametric speaker. However, the second non-final Action states that it would be obvious to use a parametric speaker in Enzmann "for the purpose of directing the noise cancellation signal to the non-snorer." *See* the second non-final Action, page 11.

As discussed in Applicants specification, paragraph [0071], parametric speakers emit ultrasound signals that are normally beyond the range of human hearing, but that interact with each other or with the air through which they propagate to form audible signals of limitable spatial extent. Applicants submit that using ultrasonic signals to form a canceling sound in a localized area is not known or obvious based on the cited prior art absent **impermissible hindsight**.

For at least these reasons, Enzmann does not disclose or render obvious all of the recitations of Claims 27 and 31. Claims 28-30 depend from Claim 27 and Claims 32-36 depend from Claim 31 and are likewise patentable. Accordingly, Applicants request that the rejections under 35 U.S.C. 103 of Claims 27-36 be withdrawn.

## **VII. Dependent Claim 5**

In addition to the reasons presented above with respect to the independent claims, Applicants submit that at least certain dependent claims are patentable for at least the following reasons.

Claim 5 depends from Claim 1 and recites that the adaptive filtering function includes a function that identifies a sound transformation between the source microphone and the cancellation location without contemporaneous sound input at the cancellation location.

The second non-final Action takes the position that this feature is disclosed in Raviv at column 6, lines 29-35. The cited portions of Raviv discuss delay stages that represent the delay incurred in accumulating signal samples for the fast Fourier Transform (FFT) stage 24 and the adaptive filter stage 25, both of which do not process signals in real time. However,


as noted in Applicants' paper dated December 21, 2007, the cited portions of Raviv refer to delays in signal processing and do not appear to relate to sound inputs. Notably, the sound signal receiving stage 12 appears to require continuous acquisition of sound input (*see, e.g.*, column 6, lines 17-18 (referring to a current digital snore sound signal)). Accordingly, Raviv does not disclose the recitations of Claim 5.

For at least these reasons, Applicants submit that Claim 5 is separately patentable and requests an indication of same.

**Conclusion**

Applicants respectfully submit that this application is now in condition for allowance, which action is requested. Should the Examiner have any matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,

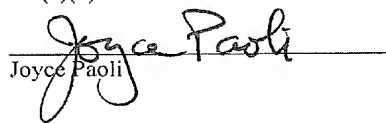


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Joyce Paoli